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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,142	07/08/2003	Robin Tudor	MOFFAT 3.0-032	2084

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EXAMINER	
LARKIN, DANIEL SEAN	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/616,142	TUDOR, ROBIN	
	Examiner	**Art Unit**	
	Daniel S. Larkin	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1,5,7-10 and 20-22* is/are rejected.

7)☐ Claim(s) *2-4 and 11-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on 27 December 2004. These drawings are approved by the examiner.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

3. Claims 5 and 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 5, claim line 1: Which claim, claim 4 or claim 1, is claim 5 depended from?

Re claim 20, claim line 1: The phrase "the concentration measuring system" lacks antecedent basis. Claim 15 is directed towards an apparatus.

Re claim 21, claim line 1: The phrase "the concentration measuring system" lacks antecedent basis. Claim 15 is directed towards an apparatus.

Double Patenting

4. Applicant is advised that should claims 16-18 be found allowable, claims 20-22 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in

wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 5, -7and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,441,340 (Cedillo et al.) in view of US 3,906,780 (Baldwin).

With respect to the limitations of claim 1, the reference to Cedillo et al. discloses a method for controlling the density of a well fracturing slurry. With specific reference to Figure 3, the reference to Cedillo et al. discloses measuring the rate of flow of a fluid stream (30) where a particulate is added; determining the rate of particulate flow (80); and calculating the density of slurry within a discharge line using a densiometer (65). The reference to Cedillo et al. fails to disclose using an acoustic sensor to determine the rate of particulate flow and the concentration of particulates in the fluid stream or filtering of the signal between the determining step and the calculating step.

The reference to Baldwin discloses a particulate material detection means for detecting the presence of particulate material, e.g. sand, in a fluid stream

flowing through a conduit. The reference discloses the presence of an acoustical means (12) positioned on the outer surface of the conduit. The acoustical means (12) is excited by the particulate material striking the interior conduit walls which causes the acoustical means to generate an output signal representative of the particulate material. Additionally, the reference discloses that acoustic noise, from things such as normal flow, pump noise, etc. is filtered out because only dominant frequencies components in the 700 kilohertz range, characteristic of particles contacting a conduit wall, are passed and processed, col. 4, lines 54-67 through col. 5, lines 1-3. Modifying the teachings of Cedillo et al. by providing an acoustic source to determine the concentration of particulate matter within the fluid stream would have been obvious to one of ordinary skill in the art because the acoustical means has a primary resonant frequency in one of its modes in excess of the 100 kilohertz range, thereby providing a proper response characteristic necessary for the detection of particulate material. Additionally, providing filtering means would have been obvious to one of ordinary skill in the art in order to ensure that background noise generated by normal flow, pump noise, and other extraneous noises striking the conduit or acoustic source housing do not contaminate the signal generated by particulates, thus creating a more accurate representative of particulate concentration.

With respect to the limitation of claim 5, the reference to Cedillo et al. fails to show the placement of the acoustical source at a location in the fluid stream where the fluid stream is forced to change directions. The reference to Baldwin discloses that the acoustical source (12) is placed at a location along the fluid

stream where the fluid stream is forced to change directions, as shown in Figure 1. Placing the acoustical source at a location where the flow stream changes direction would have been obvious to one ordinary skill in the art given that the acoustical source measures the amount of particulate material based on the fact that the particulates contact the interior wall of the conduit (10) which in turn excites the acoustic source. Additionally, changing the direction of the flow stream presents a greater opportunity for the particulates to contact the inner wall surface, which provides an easier means of detection for the acoustic source to calculate the amount of particulates in the flow stream.

With respect to the limitations of claim 7, the reference to Cedillo et al. discloses a method for controlling the density of a well fracturing slurry. With specific reference to Figure 3, the reference to Cedillo et al. discloses a fluid flow meter (30), within a fluid line before the fluid is mixed with a particulate, to measure the rate of flow of a fluid stream; means (80) to measure the rate of particulate flow; and calculating means (100) for determining the density of slurry within a discharge line using a densiometer (65), and the fluid flow meter (30). The reference to Cedillo et al. fails to disclose using an acoustic sensor located outside the fluid line at a bend in the fluid line for determining the rate of particulate flow and the concentration of particulates in the fluid stream.

The reference to Baldwin discloses a particulate material detection means for detecting the presence of particulate material, e.g. sand, in a fluid stream flowing through a conduit. The reference discloses the presence of an acoustical means (12) positioned on the outer surface of the conduit at a bend in the

conduit, see Figure 1. The acoustical means (12) is excited by the particulate material striking the interior conduit walls which causes the acoustical means to generate an output signal representative of the particulate material. Modifying the teachings of Cedillo et al. by providing an acoustic source to determine the concentration of particulate matter within the fluid stream would have been obvious to one of ordinary skill in the art because the acoustical means has a primary resonant frequency in one of its modes in excess of the 100 kilohertz range, thereby providing a proper response characteristic necessary for the detection of particulate material. Additionally, placing the sensor at a bend would have been obvious to one or ordinary skill in the art because a bend presents a greater opportunity for the particulates to contact the inner wall surface which provides an easier means of detection for the acoustic source to calculate the amount of particulates in the flow stream.

With respect to the limitations of claim 9, the reference to Cedillo et al. discloses a method for controlling the density of a well fracturing slurry that is injected into a well, which utilizes a clean fluid line (60) leading to a blender (50), the blender (50) mixing a particulate (20) with a clean fluid/water to create a slurry, a slurry line (70) from the blender (50) to a wellhead through a pumping action, col. 2, lines 46-49. With specific reference to Figure 3, the reference to Cedillo et al. additionally discloses a fluid flow meter (30) affixed within the clean fluid line (60) for measuring the rate of flow of a fluid stream; means (80) to measure the rate of particulate flow; and calculating means (100) for determining the density of slurry within a discharge line using a densiometer (65), and the

fluid flow meter (30). Although the reference to Cedillo et al. fails to expressly disclose a high-pressure pump, the examiner argues that Cedillo et al. inherently teaches this feature in view of the fact that Cedillo et al. teaches a functionally equivalent manner of pumping a slurry to a well. The reference to Cedillo et al. fails to disclose using an acoustic sensor located outside the fluid line at a bend in the fluid line for determining the rate of particulate flow and the concentration of particulates in the fluid stream.

The reference to Baldwin discloses a particulate material detection means for detecting the presence of particulate material, e.g. sand, in a fluid stream flowing through a conduit. The reference discloses the presence of an acoustical means (12) positioned on the outer surface of the conduit at a bend in the conduit, see Figure 1. The acoustical means (12) is excited by the particulate material striking the interior conduit walls, which causes the acoustical means to generate an output signal, representative of the particulate material. Modifying the teachings of Cedillo et al. by providing an acoustic source to determine the concentration of particulate matter within the fluid stream would have been obvious to one of ordinary skill in the art because the acoustical means has a primary resonant frequency in one of its modes in excess of the 100 kilohertz range, thereby providing a proper response characteristic necessary for the detection of particulate material. Additionally, placing the sensor near a bend would have been obvious to one or ordinary skill in the art because a bend presents a greater opportunity for the particulates to contact the inner wall

surface which provides an easier means of detection for the acoustic source to calculate the amount of particulates in the flow stream.

7. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,441,340 (Cedillo et al.) in view of US 3,906,780 (Baldwin) as applied to claims 7 and 9 above, and further in view of US 6,118,104 (Berkcan et al.)

The references to Cedillo et al. and Baldwin both fail to disclose the use of a digital signal processor for reducing noise detected by the acoustic sensor. The reference to Berkcan et al. discloses a method of determining the boil states of a liquid as measured by an acoustic sensor, which measures the acoustic signal, generated by the liquid as it is heated. The frequency of the acoustic signal is measured. The reference discloses a digital signal processor (DSP) 812 which may be programmed to detect desired frequency ranges, in effect filtering out undesired frequency ranges. Providing a digital signal processor would have been obvious to one of ordinary skill in the art as a means of reducing complexity of the invention by combining a processor with filtering means, which eliminates additional structure in the invention.

Allowable Subject Matter

8. Claims 2-4 and 11-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed 27 December 2004 have been fully considered but they are not persuasive.

In response to applicant's argument that the reference to Baldwin provided a lack of enablement for quantitative measurement, page 14, lines 13-15, the examiner argues that it is not the responsibility of Baldwin to provide an enabling teaching for quantitative measurement. Mere suggestion of this fact is enough to deem this teaching as prior art. Baldwin discloses that through routine calibration techniques a quantitative measurement of material concentration may be made, col. 6, lines 6-10.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Cedillo uses a densiometer to measure density and/or concentration. Baldwin is being cited to merely show the use of an acoustic sensor to determine particle concentration in a fluid flow. Baldwin although not expressly teaching quantitative measurement discloses that routine calibration techniques a quantitative measurement of material concentration may be made, col. 6, lines 6-10.

In response to applicant's argument that the combination of Cedillo and Baldwin fail to disclose the limitations of amended claim 7, the examiner respectfully disagrees. Cedillo teaches measuring the fluid after a particulate has been added to the fluid flow; and the reference to Baldwin discloses an acoustic sensor located at a bend in a conduit to measure particulates striking the conduit walls, and determining the concentration of the particulates from the amount of noise.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Larkin whose telephone number is 571-272-2198. The examiner can normally be reached on 8:00 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Larkin
AU 2856
21 March 2005

DANIEL S. LARKIN
PRIMARY EXAMINER